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### DOCTOR HOWARD VISITS HIÈRES PARASITE LABORATORY

A report from the European Parasite Laboratory, Hyères, Var, France, contains the following interesting note: "From October 29 to November 1 the laboratory was honored with a visit by Dr. L. O. Howard and his daughter, Miss Janet Howard. On November 1 they left for Paris, where Dr. Howard expects to remain until the convention of the International Entomological Congress next summer."

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### APPOINTMENT OF U. C. LOFTIN

U. C. Loftin was appointed Senior Entomologist in the Cotton Insects Division of the Bureau, effective October 7, to serve as first assistant to R. W. Harned. His headquarters will be in Washington but it is expected that he will spend a considerable part of his time in the field. Mr. Loftin is a graduate of North Carolina State College with the degree of B. S. and of the University of Florida with the degree of M. S. He was formerly employed in the Bureau (1913-1917) in sugarcane insect investigations, and in the Federal Horticultural Board (1918-1921), in charge of pink bollworm investigations in Mexico. Following that he was for nine years entomologist and field manager of a large cotton plantation in Tlahualilo, Mexico. During 1929-30 he was chief entomologist of the Cula Sugar Club, Central Baragua. He has recently completed a four months' survey of the Virgin Islands, under the Office of Insular Experiment Stations of this Department, to determine the abundance of the pink bollworm and the possibility of carrying out an eradication campaign against this pest in the Islands.

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### BEE CULTURE

A. P. Sturtevant, of the Intermountain Bee Laboratory, Laramie, Wyo., has been studying the danger of carrying American foulbrood in package bees stocked from infested hives. As bearing on this matter, he reports the conclusion of one type of experimentation which seems to indicate that even under direct inoculations, varying doses of bacillus injected into selected larvae do not necessarily produce disease. "The work on the inoculation of individual (bee) larvae with Bacillus larvae White (the bacillus of American foulbrood) was concluded for the season. Final observations at the end of the season in the five colonies reported on last month showed no disease developed in these colonies as



a result of the inoculations." These colonies were inoculated about the middle of August, ten isolated individual larvae being inoculated with varying numbers of spores in each of the experimental colonies. In all but two or three colonies all the larvae were sealed over and developed normally and emerged as adult bees without development of the disease. Two or three cells of the entire lot inoculated were removed by the bees within 24 hours after inoculation.

The use is rapidly growing of package bees to secure adequate pollination and increase in fruit production in California, and quite widely in the United States for strengthening of weak colonies or for the establishment of new colonies. On the growth of this industry in California, E. L. Sechrist, of the Pacific Coast Bee Culture Laboratory, Davis, Calif., gives the following statistics: " \* \* \* in 1930 the production of package bees was 39,928 packages, weighing 272,496 pounds. During 1931 the production dropped to 25,532 packages, weighing 178,724 pounds. \* \* \* the packages shipped were nearly all three-pound packages. All of this business was with the Western States and Canada."

A. P. Sturtevant reports that the experiments dealing with the transmission of American foulbrood by package bees have been terminated for the season. He has been making observations on 24 colonies made from packages taken the middle of August from American foulbrood colonies, in an effort to find out whether package bees from such colonies carry over the infection when allowed to develop into full colonies. On a starvation diet bees would ordinarily consume the honey in about 48 hours. In packages they are fed sugar sirup, and the question arose as to whether they carry the infection over for longer than 48 hours where ample food is available at all times, making it at least theoretically possible to carry over some of the original infected honey. Final observations show that, with one or two exceptions, all colonies which built up during the past summer from packages shaken from infected colonies showed no signs of disease. Nevertheless, the colonies will be placed in winter quarters and observations made on them next year, as it often happens that disease, although present, may not be detectable until the second year.

It has been a belief that commercial samples of honey were seldom responsible for the distribution of American foulbrood. This belief receives confirmation in the following note from Mr. Sturtevant: "Examination of all commercial samples of honey on hand has been completed. Of the 54 samples purchased on the open market during 1931, in only two was the presence of spores of Bacillus larvae demonstrated positively . . . Of the total of 191 samples examined during 1930-1931, 17, or 8.9 per cent, showed the presence of spores of Bacillus larvae on the microscopic examination."

Mr. Sturtevant also reports: "Final observations (for 1931) on the flight range and production studies were made during October. Of the 66 colonies under observation at Powell, Wyo., 35 colonies located from



1.2 to 1.5 miles from the nectar source showed an average net gain per colony of 43 pounds and 15 ounces, while 31 colonies located within the nectar source showed an average net gain per colony of 72 pounds and 2 ounces. Of the colonies located at Laramie, Wyo., on which similar observations were made, 10 colonies located on the University campus, approximately 1 1/2 miles from sweet clover, showed an average net gain per colony of 152 pounds and 11 ounces, while 9 colonies located within the nectar source on the Sechrist location showed an average net gain per colony of 209 pounds and 6 ounces, and while for 10 colonies located at the station apiary on the Hatch ranch, with sweet clover to the south and west partly surrounding them, the average net gain per colony was 177 pounds and 3 ounces."

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### DECIDUOUS-FRUIT INSECTS

W. P. Yetter, jr., in charge of bait-trap investigations of the oriental fruit moth (Laspeyresia molesta Busck) at Vincennes, Ind., submits a summary of results obtained during 1931. From a dissection of 2,107 moths he counted 113,910 eggs, or an average of 54.62 eggs per moth. Out of 12,769 moths examined he found practically even division between males and females, i.e., 49.44 per cent males and 50.56 per cent females.

L. F. Steiner, Cornelia, Ga., makes the following further comment on the season's bait-trap work for the oriental fruit moth: "The ability of the oriental fruit moth to fly long distances will prevent the use of bait traps as a control in any but large or isolated peach orchards or by several growers on a cooperative basis unless a bait can be developed which is attractive enough to prevent all oviposition in its vicinity. If the baits at Cornelia attracted moths a mile in other directions as they did from the east, the 42,000-trap experiment affected the fruit moth population over an area of at least 10 square miles. Baits in use at present can not successfully compete against the odors emanating from the foliage of the peach tree. To be most attractive they must be placed in or near the foliage. Away from the tree they capture practically nothing."

H. G. Butler, Harriman, Tenn., reports that the following parasites of the oriental fruit moth were reared in the numbers given from larvae taken in twigs in orchards in the vicinity of Harriman: "Cremastus minor, Cush., 1; Cremastus n. sp., 10; Eubadizon n. sp., 2; Glypta ruscitellaris, Cress., 2; Lixophaga mediocris Aldrich, 3; Macrocentrus ancylivora Roh. (introduced from New Jersey), 18; Macrocentrus delicatus Cress., 1,550; Microbracon mellitor Say, 2; Pristomerus ocellatus Cush. (introduced from Europe), 8; unidentified, 9. The determinations were made by the Bureau specialists in the various groups."

The two final shipments from Europe of parasites of the oriental fruit moth were made by G. J. Haeussler and J. Balakine on September 4



and September 25, respectively. The species, stages, and numbers shipped are as follows:

<u>Pristomerus vulnerator</u> Panz. (adults and cocoons).....	304
<u>Apanteles anarsiae</u> (cocoons).....	2
<u>Copidosoma pyralidis</u> Ashm. (colonies of pupae).....	50
<u>Zenillia roseanae</u> Br. and Berg. (puparia).....	14
<u>Itoplectis alternans</u> Grav. (adults).....	51
(O.F.M. cocoons inoculated).....	558
<u>Hemiteles areator</u> Grav. (adults).....	49
(O.F.M. cocoons inoculated).....	547
Haeussler species #8, probably <u>Eurytoma</u> sp. (adults)....	22
<u>Trichogramma euproctidis</u> Gahan, in inoculated O.F.M. eggs.....	500 (est.)
Field-collected <u>L. molesta</u> larvae.....	14,834

From Italy, 135 Pristomerus, 20 Copidosoma, 2 Zenillia, and 10,549 Laspeyresia molesta larvae were obtained, the remainder being from France.

R. W. Burrell reports: "The first Australian shipment of oriental fruit moth parasites, containing 2,470 cocoons of Perisierola sp., was shipped to Moorestown, N. J., October 6." After overcoming considerable difficulties in the way of carrying stock through to pupation, Mr. Burrell has been able to breed four successive generations and to obtain a surplus for shipment. The second shipment, also containing Perisierola sp., left Australia October 27.

Mr. Burrell also states: "The determination of another fairly common parasite has been obtained. This is Eurytoma pyrrhocera Crawford, the third most common parasite of the Sydney district. A. P. Dodd, of the prickly-pear investigations, considers that Burrell's Stomatoceras bred from L. molesta may be identical with his S. fasciatipennis, a common parasite of Cactoblastis cactorum Berg. Another rather large unknown ichneumonid parasite has been discovered which occurs in the Sydney and Mooroopna districts. It has been found that it attacks the host pupae, the larvae feeding externally within the host cocoon."

F. P. Dean, Yakima, Wash., "has compiled the results of his laboratory tests of insecticides on the eggs and larvae of the codling moth, and some very interesting things are indicated," according to E. J. Newcomer, who says: "The laboratory tests indicate that a 1 per cent emulsion (containing approximately 0.8 per cent oil) kills about 90 per cent of the eggs, while 1/2 per cent emulsion (0.4 per cent oil) kills about 75 per cent. Fish oil has been suggested as a sticker for various spray materials, and its possible egg-destroying value has been investigated. At 1 quart to 100 gallons (0.25 per cent) it killed approximately 50 per cent of the eggs, while at 0.05 per cent it killed only 20 per cent. Rotenone at 1/2 pound to 100 gallons, dissolved in acetone, killed 53 per cent of the eggs sprayed, but as less than 100 eggs were used, and



the eggs in the check did not hatch well, this experiment is not conclusive. \* \* \* Control of the larvae with rotenone dissolved in acetone was extremely good shortly after application, but a week later it was poorer than with lead arsenate. Pyrethrum, in both alcoholic and oleic solutions, also gave fairly good control immediately after spraying. \* \* \* In all, over 400 larvicidal tests were made, but as nearly every test of an insecticide was repeated six times, three times immediately after spraying and three times a week later, this work includes only 66 tests of different combinations or dilutions."

Life-history studies of the peach borer (Synanthedon exitiosa Say) at Harriman, Tenn., have been completed and are reported by H. G. Butler, as follows: "Adult emergence began June 11 and continued until September 21. \* \* \* Between August 27 and September 16 1,569 moths were recorded as emerging from the treated and untreated trees. This constitutes 67.5 per cent of the season's emergence. It was found that over 40 per cent of the adults emerged at approximately 6 or more inches from the tree. Insectary studies of the potential oviposition of adults of the peach borer show that the average of 26 adults was 761 eggs each. The actual oviposition was approximately half the potential oviposition under insectary conditions. The average incubation period of 421 peach borer eggs was 9.2 days, with a minimum of 7 and a maximum of 12 days."

G. A. Runner, who is engaged in grape insect investigations at Sandusky, Ohio, has been testing adhesives for grape sprays. He states: "Sulphonated castor oil, \* \* \* was found to give excellent spreading and adhesive qualities to spray mixtures during the course of the experimental work of 1930."

G. F. Moznette, Albany, Ga., submits results of field tests of contact insecticides against the black pecan aphid (Myzocallis fumipennellus Fitch) which may be summarized as follows: As ordinarily used with potassium fish-oil soap, nicotine sulphate 40 per cent requires a concentration of approximately 1 to 1,000 for satisfactory results. With potassium oleate soap and with a commercial "activator," nicotine as dilute as 1 to 4,000 gave comparable results. When combined with calcium caseinate, on the other hand, the nicotine sulphate was rendered somewhat less effective than when used with ordinary fish-oil soap.

Reporting on mass production (by Spencer and Brown) of Trichogramma minutum Riley as a parasite of pecan insects at Albany, Ga., Herbert Spencer says: "The Albany strain of Trichogramma, a bright yellow variety, has been increased greatly during October, and the indications are that this local strain will be superior to the one from Texas in traveling ability, length of life, and reproductive capacity."



## JAPANESE BEETLE AND ASIATIC BEETLE RESEARCH

Corrections: (1) In the September issue of the Monthly Letter the latter half of the third paragraph refers to the Japanese beetle; (2) The note about R. M. Burrell should indicate that he is to continue in Japan studies of parasites of scarabaeids.

Outstanding features of the control investigations of the Japanese beetle during October, according to W. E. Fleming, of the Moorestown, N. J., laboratory, include the completion of a grub survey of turf experiments at Swarthmore, Pa., where "all the grass plots which had been treated last June were examined to determine the density of the grub population in the soil. A total of 430 diggings were made. M. R. Osburn reports that the average number of *Popillia* larvae in the Swarthmore campus was 52.5 to a square foot on the untreated grass, 21.1 on the plot sprayed with lead arsenate, and from 11.1 to 23.6 on the plots dusted with different mixtures of lead arsenate and the carrier. A larval survey on the hockey field at Swarthmore College showed an average of 45.1 larvae to a square foot. The College treated this field in October. L. Koblit-sky analyzed 220 samples of the treated soil from the plots at Swarthmore and found practically all of the arsenic in the upper inch of soil. The penetration of the liquid applications was slightly better than the dry application."

"A larval survey, under the supervision of W. E. Fleming and F. E. Baker, has been completed on the four nursery plots containing evergreen and deciduous stock, the soils being maintained at dosages of 1,000, 1,500, and 2,000 pounds of lead arsenate per acre in the upper 3 inches of three, and the fourth remaining untreated. The survey showed an average of 1 *Popillia* larva in 210 square feet in plots having 1,000 pounds, and no *Popillia* in the plots having 1,500 and 2,000 pounds; the infestation in the untreated plot averaged 1 *Popillia* larva to 1.5 square feet. Two larvae recovered in the 3,000-pound plot were identified by R. J. Sim as *Phyllophaga gracilis* Burm."

The final observations on different varieties of hydrangeas growing in soil treated with barium fluosilicate have been made by W. E. Fleming and F. E. Baker. Mr. Fleming states: "There is considerable variation in the resistance of different horticultural varieties to the action of barium fluosilicate. Only one variety grew in a dosage of 3,000 pounds, two in 2,500 pounds, six in 2,000 pounds, and ten in 1,500 pounds of barium fluosilicate per acre."

"Two tests have been made" at Moorestown by E. R. Van Leeuwen, "to determine the effect of centrifugal force on the larva of the Japanese beetle. Fifteen larvae were whirled for 10 minutes at 1,700 revolutions per minute, and an equal number for the same period at 3,200 revolutions. Two larvae survived in each treatment."

J. W. Lipp is carrying on a series of experiments at Moorestown to determine the value of injecting dilute carbon disulphide emulsion



into the soil of potted plants and into "balled" nursery plants for the purpose of destroying the larvae of the Japanese beetle. He reports that "the carbon disulphide emulsions prepared with castor-oil soap emulsifier and with sodium resinate-oleate emulsifier are comparable in toxicity. It has been found possible to destroy infestation in 5-inch pots by injecting 1.25 cubic centimeters of emulsified carbon disulphide with 250 cubic centimeters of water. The larvae have also been destroyed in the soil of balled evergreens by injecting the emulsion and placing the soil in dilute carbon disulphide emulsion for 1-1/4 hours."

F. E. Baker, of the Moorestown laboratory, has found "that the forcing hydrangeas can be grown under cages of copper wire and galvanized-iron wire throughout the growing season without causing injury to the plants. The results indicate that the plants can be kept free of infestation with the Japanese beetle by this procedure."

In summarizing the trapping experiments for the season 1931, F. W. Metzger, Moorestown, found "that traps with green cylinders and white baffles and funnels caught 115 per cent more (Japanese) beetles than traps which had not been painted for one or more seasons. The nickel traps caught 181 per cent more beetles than the standard trap. Traps with the bait in the baffle caught 117 per cent more beetles. The bait made in 1930 was found to be as attractive as bait made in 1931."

Reporting on parasite investigations at the Moorestown laboratory J. L. King says: "Among the most important observations of the season are those made by M. H. Brunson in his rearing work with field-collected females of Tiphia popilliavora Rohwer. He finds that female Tiphia taken in the field at the same time females are being collected for colonization produced from 1,314 cocoons 632 male Tiphia and only 31 females. While this is a preliminary rearing the results are sufficiently important to change future colonization methods to the extent that at least an equal number or more males will be liberated with each unit of females so as to insure fertilization. Further research to augment successful colonization of T. popilliavora will follow these preliminary rearings."

R. W. Burrell submits a report of his research for parasites of scarabaeid beetles at Homebush, Australia, during September, in which he states: "A fair amount of scouting for Thynnidae was done locally about Sydney, and limited numbers of one species were secured flying about a strawberry bed. These were taken into the laboratory and tried against all the species of grubs that occurred in the district near where they were taken. The Thynnidae lived only a week in captivity. They readily paralyzed three of the five local species of grubs, but they did not deposit eggs thereon. Dissections show that their egg is rather heavily chitinized, and of the same approximate size and shape as the eggs of Tiphia. Thynnidae emerged during the early part of the month from cocoons that were dug last fall in sod on the edge of a strawberry bed near Melbourne, so a field trip was made to this place and Warrhambool, another place where cocoons were secured, the last of the month. However, a cold rainy spring has greatly delayed insect development at both these places, and no Thynnidae were secured in the field."



# TROPICAL, SUBTROPICAL, AND ORNAMENTAL PLANT INSECTS

P. A. Berry, in charge of the colonization work on the natural enemies of the citrus black fly (Aleurocanthus woglumi Ashby) in Cuba, reports that 30 groves, previously heavily infested, are now commercially clean as a result of the attack upon the fly by the imported parasite Eretmocerus serius Silv. These groves are distributed throughout the island, one being in the province of Camagüey, one in Matanzas, two in Santa Clara, one in Pinar del Rio, and the remainder in Havana Province. In the latter province the distribution is now so complete that on even isolated trees the fly is found to be parasitized. In practically all groves in which the parasite has been established for some months a very noticeable improvement in coloration is apparent. The coating of sooty mold fungus on the foliage and fruit is gradually disappearing and the normal coloration and appearance are being restored. Those groves which originally had only light infestations have quickly become clean. While it is probable that slight outbreaks will show up from time to time in the controlled groves, yet these will be quickly cleared up by the parasite before the pest can increase sufficiently to be of economic importance.

H. H. Richardson has found, as a result of investigations at the greenhouse in Washington, D. C., that "Insecticidal tests of a standard commercial insecticide containing 11.7 per cent potassium soap, 2.1 per cent potassium carbonate, 7 per cent terpenes, and 79.2 per cent water indicated that this material (at a dilution of 1 to 16, 6.5 per cent) was quite promising for the control of both the common red spider mite (Tetranychus telarius L.) and the citrus mealybug (Pseudococcus citri Risso). Plant tolerance for this insecticide was quite good. Two applications at an interval of one week produced no apparent injury to ageratum, Boston fern, calendula, chrysanthemum, coleus, cowpea, croton, cyclamen, nasturtium, pepper, and pachysandra. Snapdragons were very slightly injured; geraniums and maiden-hair fern were definitely injured, but recovered."

Mrs. L. T. Kessels and A. N. Cressman have continued seasonal-history counts on the camphor scale and submit the following table which offers a comparison with previous years:

	1926	1927	1928	1931
Peak of producing.....	Sept. 5	July 26	Sept. 1	Oct. 6
Peak of first instar.....	Sept. 10	Aug. 20	Sept. 15	Oct. 15
Peak or second instar.....	Oct. 1	Sept. 5	Oct. 11	Nov. ?

From this table "it is seen that the scale this year is roughly one month later than in 1926 and 1928, and two months later than in 1927. In 1927 there was a partial fourth brood."



From the submergence tests of larvae of fruit flies (*Anastrepha*) made at Panama, Canal Zone, by James Zetek, "it is evident that infested fruits, if dumped into Gatun Lake (for example) can float around for days and finally reach shore, and at least some of the larvae can reach earth and pupate."

A third shipment of adult parasites, consisting of 600 *Diachasma tryoni* Cam. and 100 *Opius humilis* Silv. sent by A. C. Mason, Honolulu, T. H., has been received by Prof. Harry S. Smith, at the Citrus Experiment Station, Riverside, Calif. Mr. Smith reports that the insects had parasitized the walnut husk maggots (*Rhagoletis completa* Cress.) in his laboratory and are developing satisfactorily in their new hosts. "The only question now," Mr. Mason says, "is whether they can hibernate in California and be able to synchronize their life history with that of the host."

R. H. Marlowe, of the toxicological unit, Honolulu laboratory, reports as follows on the lethal effect of distilled and sea water on, and pupation of, larvae of *Ceratitis capitata* Wied.: "The effect of distilled water on the pupation of larvae is influenced almost entirely by depth. The influence of sea water on the per cent pupation is affected not only by depth but also by density, and the probable factors of volume, liquid-air surface exposed, and the biochemical reaction of the salt solution no doubt exert some influence on the lethal effect of the solutions on the larvae. The effect of sea water as to drowning is much greater than that of distilled water, but the influence indirectly on the mortality of the pupae is not so great. \* \* \* In distilled water the larva swells; in sea water it shrinks. \* \* \* Total per cent pupation is greater in distilled water (55 per cent) than in sea water (35.9 per cent). • A certain percentage of adult *Ceratitis capitata* will emerge, not only from larvae that pupated during eight hours' submergence in distilled and sea water at certain depths, but also from larvae pupating upon removal from the solutions."

O. C. McBride, Honolulu, reports on a heat-sterilization experiment made on pineapple to determine the heat distribution and kill of mealybugs when the room was packed full. Thirty thousand plants were used in the experiment. Mr. McBride says, "Air and temperature records were made by means of thermocouples placed at twelve different points in the room \* \* \* It requires 4 1/2 hours to bring the inside plant temperatures from 26.5° C. to 50° C. When the plants reached 50° C., the steam was shut off, the fan reversed, and the plants left in the room over night. One hundred and twenty plants, as checks, selected at random, gave a count of 2,081 mealybugs, alive. A random selection of another 120 plants after heating gave a count of 117 live mealybugs, or a kill of 94.38 per cent. Working with smaller samples and holding the temperature for one-half hour after the inside plant temperature reached 50° C., we secured 100 per cent kill. On the basis of experiments to date, it appears that the heat-vapor saturation method can be satisfactorily employed for the control of mealybugs on pineapple planting stock."



## TRUCK-CROP INSECTS

A. C. Davis, who is engaged in studies of mushroom insects at Takoma Park, Md., has found that "The artificial rearing medium for phorid flies does not seem to be so successful as it was hoped it would be. One generation can be reared upon spawn, manure, or artificial medium, but the eggs laid do not hatch. This seems to be the common experience, both O. E. Gahm and C. A. Thomas having found the same thing. These flies are present all through the season in most mushroom houses."

S. E. Crumb, Puyallup, Wash., reports having received "from the European Parasite Laboratory at Hyères, France, approximately 150,000 earwigs as a source of the dipterous parasites Digonichaeta setipennis Fall. and Rhacidoneura antiqua Meig. for rearing and ultimate colonization in the Pacific Northwest. From these at least 2,000 puparia of Digonichaeta have been obtained. The percentage of infestation by Rhacidoneura can not be determined until next spring, since this species passes the winter in the host. The collections purposely were made somewhat late for Digonichaeta in an effort to secure as many as possible of the rarer Rhacidoneura."

Some results of a study of the part that birds play in the biological control of the celery leaf-tier at Sanford, Fla., are reported by Dayton Stoner. "In addition to the field observations, \* \* \* stomachs of 521 birds representing 24 species have been collected. \* \* \* it now seems evident that the Florida red-winged blackbird is the most important single local bird species in checking the increase of the celery leaf-tier. \* \* \* In the 1928-29 season, the one in which the celery leaf-tier was most abundant since this investigation was begun, this insect in larval, pupal, and adult stages made up almost 18 per cent of the birds' food for the season. The statement is based upon the examination of 34 stomachs. One stomach taken March 25, 1929, contained 31 larvae and 78 pupae of the celery leaf-tier." Mr. Stoner also says that "other major insect pests of celery such as cutworms (Noctuidae), plant lice (Aphididae), the celery looper (Autographa falcifera Kirby), and the garden flea hopper (Halticus citri Ashm.) constitute a prominent part of the food of these as well as of several additional bird species. As a result, it can not be doubted that birds take a very prominent part in curtailing not only the numbers of the celery leaf-tier, but also of other insect pests of celery in the Sanford district."

An experiment to determine the effects of time of planting on the infestation of lima bean pods by the pod borer (Etiella zinckenella Treit.) has been completed at Ventura, Calif. Rodney Cecil states that the percentages of wormy pods of Baby Limas and Big Limas, respectively, planted on May 15 were 5.01 and 3.94; planted on June 5, 8.36 and 39.63; and planted on July 7, 58.35 and 91.42.

Reporting on the status of the tachinid parasite Paradexodes epilachnae Ald., parasitic on the Mexican bean beetle, Neale F. Howard, Columbus, Ohio, says: "The recovery of the tachinid fly at Columbus and



Athens, Ohio, and Las Cruces, N. Mex., indicates that the establishment of the species for the current season is assured. The abundance of the parasite at Columbus and Athens indicates that conditions here are very satisfactory, at least late in the summer. If the fly can withstand the northern winter, it is believed that the introduction will be very successful. While no collections were made in Georgia, Alabama, or Kentucky, it is felt certain that the fly has become established there, at least in the latter two places, for conditions in Alabama and Kentucky were very favorable for it. At both latter places all stages of the bean beetle were present and favorable weather continued for many weeks after liberation. More flies were liberated at Birmingham, Ala., than at any other place. While the bean beetle infestation was not all that might be hoped for it at Las Cruces, N. Mex., the climatic conditions there would appear to be more favorable than at any other place in the United States where the bean beetle occurs in abundance."

L. W. Brannon, Norfolk, Va., is conducting a study of the life history and habits of the sweetpotato leaf beetle (Typophorus viridicyaneus Crotch), about which there is little known, although it has been observed to attack sweetpotatoes for many years in certain sections of the South. He says: "It is apparent \* \* \* that the insect will pass the winter in the larval stage and that only one generation develops during the year. Full-grown larvae were found feeding inside potatoes during the first part of the month, and in the same cages where these observations were made numerous larvae were found in the soil beneath the surface. Notes have been kept of larvae which have been observed in cells at the bottom of glass jars used in rearing. The majority of the full grown larvae have been observed in cells in the jars for a month or more in a quiescent state."

E. W. Jones, of the soil insects laboratory at Walla Walla, Wash., submits data for October on the hibernation depths of larvae and adults of Pheletes californicus Mann. and P. canus Lec. In a field containing a mixed stand of the two species 100 per cent of the larvae were found in the first foot of soil, and 72 per cent of the larvae and 89 per cent of the adults were hibernating at 3 to 9 inches. In a pure stand of P. californicus 75 per cent of the larvae and 66 per cent of the adults were found hibernating at 3 to 9 inches. In a pure stand of P. canus 64 per cent of the larvae were found at 9 to 15 inches, and 77 per cent of the adults were found at depths of 3 to 9 inches.

Feeding experiments with the wireworm Pheletes californicus at Alhambra, Calif., are reported by Roy E. Campbell. Results of these experiments indicate "that larvae can readily exist on very small amounts of food for long periods of time. It is also evident that the length of the larval stage of wireworms may either be lengthened or shortened depending on the amount of food consumed or available. \* \* \* the majority of larvae which hatched in 1930 may complete their life cycle during the spring of 1932, providing, however, that they have favorable moisture, temperature, and food conditions. \* \* \* larvae do not necessarily have to be of a certain size in order for pupation to occur; furthermore, the policy of attempting to determine the age of larvae according to their size appears questionable."



In connection with studies of parasites of the beet leafhopper (Eutettix tenellus Baker) by C. F. Henderson and assistants at Twin Falls, Idaho, P. N. Annand says: "It is of interest to note that the percentage of parasitism of male E. tenellus was greater than that indicated for the females, the size of the parasites in the two sexes being practically the same."

In regard to egg parasites, Mr. Annand states: "Dissections of a large number of E. tenellus females indicated that on September 11 there were practically no mature eggs within the ovaries. This has an important bearing on the life history of egg parasites, for it is evident that eggs of the overwintering host could not have been deposited after this date."

Migratory movements of the beet leafhopper have been the subject of study at Davis, Calif. William C. Cook says that on October 27 he "witnessed a migration of tenellus into the mouth of Big Panoche Pass. The bugs were coming in in large numbers at sunset and were travelling slightly west of south on a light breeze from the north. The wind movement was about 200 feet per minute. Mr. Romney also witnessed a similar migration near the mouth of Hospital Canyon on October 24; in this case, also, the bugs were flying with the wind. It is quite noticeable that on days when many bugs were moving there was a very light wind movement, and generally in the western side of the valley this wind movement comes from slightly east of north, undoubtedly due to deflections of the general wind currents by the mountains on the east side of the valley. All our evidence tends to indicate that the fall migration is a general southward drift and that the finding of the canyons is more or less accidental. As these canyon mouths are practically the only places on the western side of the valley where the vegetation is green, the bugs concentrate on these areas."

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## FOREST INSECTS

Ralph C. Hall, Columbus, Ohio, reporting on investigations of the locust borer (Cyllene robiniae Forst.) says: "An analysis of these data so far has demonstrated that a very close relationship exists between site and injury by the locust borer. When based upon site index<sup>1</sup> the relationship is an inverse one, the higher the site index the lower is the amount of injury. This confirms the opinion formed from general observations during the collection of the data. There appears to be a definite relationship between crown class<sup>2</sup> and injury by the locust borer. Age affects this relationship, however \* \* \* Up to ten years of age the relationship between crown class and injury is as follows: the dominant class shows the highest percentage of injury, followed by the codominant,

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<sup>1</sup> "Site index" refers to the quality of the environment in which trees are growing. There are several site qualities used to designate the comparative volume increment in a stand of timber over a period of years. Frequently five classes are used.

<sup>2</sup> "Crown class" refers to the position of the crown of the tree in the forest canopy. "Dominant" trees are those that have their crowns highest; "codominant," "intermediate," and "overtopped" are decreasing grades.



intermediate, and overtopped. The last group shows the least amount of injury. After ten years of age the relationship reverses and we find the overtopped class showing the highest percentage of injury and the dominant class the lowest."

In October a final examination of yellow pine slash was made by J. A. Beal on an April windfall area near Bly, Oreg. F. P. Keen reports: "Emergence of the western pine beetle from this type of material was found to be very spotty. It ranges from nothing to one hundred and sixty emerging beetles per square foot. On the whole the emergence from wind-thrown yellow pines is about what had been predicted during an earlier examination in the spring. Trees slightly off the ground and with a large part of their foliage intact showed better emergence than those which had less opportunity for drying out. Insect increase from this type of material can not be considered a serious menace to standing timber. \* \* \* An examination of two yellow pine logging areas in Idaho was made to compare slash-insect conditions with those found in Oregon and Washington. They were not found to be noticeably different. In one operation where logging ceased in midsummer an outbreak of Ips oregoni Eich. (the Oregon pine bark beetle) is assuming large proportions.

D. L. Parker, of the gipsy moth laboratory, Melrose Highlands, Mass., who has been collecting satin moth larvae from burlap bands put out in 20 towns extending from Ogunquit, Me., to Cranston, R. I., states that dissections of hibernating larvae, secured from bands put out in 16 towns, have been made. "Apanteles larvae were found in all of the collections and Meteorus larvae in three of the collections. The numbers of larvae from each town were rather small. Newmarket, N. H., was the site of a colony of Meteorus liberated in 1930 and in the collection from this point a satisfactory number of Meteorus larvae were found."

The Budapest, Hungary, substation has been able to forward rather large shipments of birch leaves containing hibernation cells of the larvae of the leaf-mining sawfly (Phyllotoma nemorata Fall.) secured in Austria. In a summary Mr. Parker reports that "during the month 1,483 cells, 10 hibernating larvae of a braconid parasite, and 20 leaves containing chalcid parasites, were received from Monichkirchen, Austria. Also, 20,420 cells, 151 hibernating larvae of a braconid parasite, 20 leaves containing chalcid parasites, and 82 cells showing a fungus, were received from Freistadt, Austria." \* \* \* P. B. Dowden states that 300 of the nemorata larvae have been dissected and that only one internal parasite has been found. He further states that the cells have been divided into three lots which will be placed in hibernation in different ways.

R. C. Brown, Melrose Highlands, Mass., who has been studying the records of parasitism of "hibernating larvae" and "summer larvae" of the brown-tail moth (Nygmia phaeorrhoea Don.) by the fungus Entomophthora ulicae Reich. for the period 1919 to 1931, says: "From 1929 to 1931, inclusive, the recorded percentages of parasitism by the fungus may be considered fairly indicative of the conditions existing in southeastern New Hampshire and southwestern Maine. The records show that from 1924 to



1931 there has been a gradual building up of parasitism by this fungus, interrupted only by a drop in percentage of parasitism in 1928 and 1929. The average percentage of summer larvae killed in the above-mentioned area was over 9 per cent in 1931, as compared with 0.5 per cent in 1929 and a much lower figure in 1924."

S. F. Potts and Russell R. Whitten, Melrose Highlands, are continuing fumigation experiments begun last spring with hydrocyanic acid gas to ascertain under what conditions and at what dosages hibernating satin moth larvae may be killed without injury to the trees on which they occur. Mr. Potts states: "It may be interesting to know that a partial vacuum and an air pressure as high as 150 pounds per square inch had little effect on the several species of lepidopterous larvae dealt with." According to Mr. Whitten the percentages of hibernating larvae killed in the cement-block compartment under various conditions of fumigation, as indicated by examinations of material, were as follows:

									Per cent
Sodium cyanide,	5 oz.	per	1,000 cu. ft.,	70-74° F.,	6 hrs.	exposure,	16.8		
"	"	5 "	" 1,000 "	" 80° F.	6 "	"	18.9		
"	"	10 "	" 1,000 "	" 60-63° F.,	24 "	"	70.9		
"	"	10 "	" 1,000 "	" 80-83° F.,	24 "	"	96.0		

Regarding spray experiments with the European pine shoot moth (*Rhyacionia buoliana* Schiff.), in which C. M. Symonds assisted, C. E. Hood, Melrose Highlands, states that "periodical examination of the buds from the spray plots at Brookline, Mass., were made this month, and it was found that 57.1 per cent of the terminal buds in the sprayed plots were injured, while in the check plots 100 per cent of the terminal buds were injured. In the sprayed plots 14.4 per cent of the secondary buds were injured, as against 26 per cent in the check plot." Various strengths of lead arsenate, with fish oil added, were used in spraying these plots.

#### CEREAL AND FORAGE INSECTS

Reporting on investigations of the corn ear worm (*Heliothis obsoleta* Fab.) at Charlottesville, Va., W. J. Phillips says: "The fall emergence of ear worm moths has been unusually high. We have recovered a total of 377 moths from our hibernation cages. This emergence was from a total of 10,000 larvae that we placed in our cages last month. Emergence for the same period last year was 489 moths recovered. We believe the extremely hot weather the first part of the month was responsible for the high emergence."

"Information was recently obtained" by C. H. Batchelder, Arlington, Mass., "concerning the length of time necessary to kill second-generation European corn borer larvae of the fifth instar when exposed to temper-



atures of +15°, 0.0°, -10°, -20°, and -25° F.," according to a report submitted by D. W. Jones. "Comparatively short periods of exposure are fatal at and below -10° F., but at 0.0° F. and at +15° F. the larvae exhibit greater resistance, due apparently to a low freezing point of some body constituent other than water. \* \* \* Establishment of these periods of lethal exposure has a direct application to commercial processing of green sweet corn and provides a guide for sterilization by means of cold."

T. E. Holloway, of the sugarcane moth borer project at New Orleans, La., reports that "a search has nearly been completed," by himself, W. E. Haley, and H. A. Jaynes "for the parasites from Peru released during the summer. Recoveries have been made at two plantations. At one place a moth borer larva which had evidently been parasitized by the fly Paratheresia claripalpis V. d. W. was found. At another plantation nine empty cocoons of the wasp Ipobracon rimac Wolcott were discovered. The two parasites from Peru have therefore lived for at least one generation under Louisiana field conditions."

H. L. Parker, of the European Parasite Laboratory, Hyères, Var, France, says that a weevil "being parasitized by Exeristes roborator Fab. has now been identified by Charles Fagniez as Larinus longirostris Gyll. Although A. Hustache in his "Curculionidae Gallo-Rhenans" lists Larinus lenzae G. W. Fabre and L. stoehelinae Bed. as hosts of this parasite, this is the first record of its being found on L. longirostris. In each case the pupal stage was the one attacked."

According to E. V. Walter of the San Antonio, Texas, laboratory, he found the sorghum midge (Contarinia sorghicola Coq.) plentiful in the El Paso, Tex., region (elevation about 3,500 feet) this year as well as in other places far beyond its previously known western limits. Two of the localities recorded are beyond the 105th meridian and Mr. Walter says: "This is the first record we have of the sorghum midge being found west of approximately the 100th meridian or above an elevation of approximately 2,000 feet."

J. C. Frankenfeld, Tempe, Ariz., says that "a parasite of the genus Chalcis, which is likely Chalcis ovata Say, since that was reared during the years 1913-14 from the pupa of the range caterpillar (Hemileuca oliviae Ckll.), is parasitizing many pupae of the species this season."

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#### COTTON INSECTS

Airplane collection of insects has been continued at Tallulah, La. P. A. Glick, J. M. Yeates, and assistant report: "Twenty-seven flights were made during the month of October \* \* \* using a total of 22 hours and 25 minutes, in the exposure of the screens. \* \* \* A total of 525 insects were collected at the following altitudes (with the number of insects taken given in parenthesis): 200 feet (249), 1,000 feet (111), 2,000 feet



(81), 3,000 feet (66), 5,000 feet (8), 6,000 feet (1), 9,000 feet (1), 11,000 feet (3), 12,000 feet (4,) and 13,000 feet (1). \* \* \* The total collection of insects for the month \* \* \* showed an average of 4.31 insects taken in a period of ten minutes (exclusive of altitude flights) as compared with 4.12 insects taken in the previous month."

Mr. Ewing, Tallulah, La., states: "During the month of October a total of 8,100 sweeps with a hand net were made to determine the population of Lygus pratensis (L.), Psallus seriatus Reut., and Adelphocoris rapidus Say on eight weed host plants and cotton. The average number of Psallus seriatus collected per 100 sweeps from croton during the first, second, third, fourth, and fifth weeks was 805.5, 263.3, 69.0, 30.0, and 3.0 respectively.

Table 1.-Average per 100 sweeps of Lygus pratensis (L.) collected from 3 main host plants. Average of from 200 to 300 sweeps for each plant per week

Host plant	1st week	2nd week	3d week	4th week	5th week
	September 28-Oct. 3	October 5-10	October 12-17	October 19-24	October 26-31
<u>Aster ericoides</u> L.....	117.0	169.4	262.3	354.3	254
<u>Erigeron canadensis</u> L....	194.0	126.0	122.0	217.4	238
Goldenrod.....	196.5	264.7	734.6	1,100.3	518.5

"The above table shows that these three plants were important hosts of Lygus pratensis during October. All three plants were found quite abundantly in this vicinity throughout the month. Chamaecrista robusta died out during the first week in October, thereby eliminating it as a further host for Adelphocoris rapidus. In fact there was no plant on which A. rapidus was found in any great numbers during October. There were very few mirids found in cotton at any time of the month."

W. L. Owen, jr., who with S. L. Calhoun, L. C. Fife, and L. W. Noble has been conducting life-history studies of the pink bollworm (Pectinophora gossypiella Saund.) at El Paso, Tex., summarizes the oviposition records of 23 moths of the fourth generation as follows:

Number of females.....	23
" of fertile females.....	20
Per cent fertile.....	86.9
Average number eggs per fertile female.....	151.8
Maximum " " " " " .....	434.0
Average number eggs for 23 females.....	132.6
Average longevity for females (days).....	14.2
Maximum " " " " " .....	21.0



Average longevity for males (days)	15.1
Maximum " " " "	28.0
Average preoviposition period "	3.27
Maximum " " "	8.00
Average oviposition period "	8.8
Maximum " " "	17.0

A. J. Chapman and L. W. Noble, reporting on migration studies of the pink bollworm, state: "A total of 233 moths have been taken from the migration screens during the month (October). The weekly catch has increased from 9 for the first week to 80 for the last week. This is by far the greatest migration that has ever occurred at Presidio."

F. F. Bondy, Florence, S. C., reports results of poison tests for control of the boll weevil (Anthonomus grandis Boh.). Seven series of tests were carried out. \* \* \* The conclusions from these experiments are that (a) "All tests receiving calcium arsenate dust or in combination with molasses mixture gave good substantial gains;" (b) "All tests receiving only molasses mixture or sodium fluosilicate gave practically no gains."

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#### INSECTS AFFECTING MAN AND ANIMALS

"The latter half of September and most of October were devoted to studies of the tick situation in Louisiana," writes H. O. Schroeder, Brownsville, Tex. "This investigation was prompted by the occurrence this summer of four cases of Rocky Mountain spotted fever, three of which were fatal, in the vicinity of Center Point, Avoyelles Parish, La. There was a clear history of tick bites in each of these cases. A rather complete epidemiological study was made of this outbreak. The lone star tick (Amblyomma americanum L.) and the cattle tick (Margaropus annulatus Say) are the two dominant species of tick at this time of the year. The former occurs in large numbers in localized areas in the larval and nymphal stages. "I have found considerable numbers of flat larvae on grass, underbrush, and low pines in the pine woods. I have not found them in low lands wooded with oaks. They are probably as abundant or more so in the pine woods near the Reed home (where two fatal cases occurred) than anywhere else. \* \* \* Several hundred ticks collected around Center were sent to Dr. R. R. Parker of the Spotted Fever Laboratory, U. S. Public Health Service, Hamilton, Mont., to be tested for infection. Dr. Parker reports that all these were negative with one exception, and this was not clear-cut positive infection."

D. C. Parman, of the Coachella, Calif., sublaboratory, presents a summary of the work done with parasites and predators of blowflies during the summer. He says: "Three general areas have been covered in this



work during the summer. \* \* \* Exposure jars were placed from one to ten miles apart over the intervening sections, collected, and returned to Uvalde (Tex.) for breeding out the materials and making records of materials collected in the jars. A total of 835 jars were exposed and 795 were returned, the difference being accounted for by jars being destroyed or stolen at settings. Practically every jar received at Uvalde produced returns." The following totals "give a fair idea as to the general distribution of the flies bred out, the three larval parasites, and the three families of predacious beetles: number of jars exposed, 835; total number of flies emerged, 56,214; total *Brachymeria* emerged, 677; total *Xyalosema* emerged, 861; total *Alysia ridibunda* emerged, 511; total *Mormoniella* emerged, 5,090; predacious beetle jars, 436. \* \* \* A few of several other species of Diptera have been bred and recorded. It is worthy of note that approximately 91 per cent of all flies bred from the jars were sarcophagids of several species."

Mr. Parman also states: "*Brachymeria fonscolombei* Dufour is indicated to be rather generally distributed in scattered infestations east of the Rio Grande Valley and one small infestation was had near Safford, Ariz. This parasite has been found as far east as Waller, Tex., and as far south as Tampico, Mex.. this season. *Xyalosema* sp. has been indicated to be rather generally distributed west of the Pecos Valley with a few scattered infestations at Uvalde and south to San Louis Potosi, Mex. *Alysia ridibunda* Say has been indicated to be present in a small area at Safford, Ariz., Deming, N. Mex., and Las Cruces, N. Mex. *Mormoniella* is indicated to be rather generally distributed over all sections \* \* \* A very few *Spalangia* sp. have been bred from a few jars."

R. A. Roberts, who has had charge of the breeding work and local parasite status at Uvalde, Tex., submits results of emergence tests for the season:

Allen ranch				Brice ranch			
<i>B. fonscolombei</i>		Flies		<i>B. fonscolombei</i>		Flies	
Number	Per cent	Number	Per cent	Number	Per cent	Number	Per cent
443	77.99	125	22.01	21	33.87	41	63.13
4	12.90	27	87.10	23	62.16	14	37.84

In connection with life-history studies of mosquitoes at Portland, Oreg., H. H. Stage reports: "At Wahkeena Falls, three adult *Aedes vexans* Meig. were taken on October 5 and only one on October 7 in the customary ten-minute collection. None have been taken since. Because the last pupae emerged at that point not later than June 22, these individuals were at least 105 and 107 days old. In 1930 the longest-lived individuals of this species were taken 112 days after emergence."



R. W. Wells, Galesburg, Ill., states that on October 16 he "made post mortem examinations of about 30 head of horses slaughtered at Rockford, Ill. Practically all of the maturing (*Gastrophilus*) larvae had left the horses. About 90 per cent of the new generation of larvae were found in the anterior end of the duodenum. In some cases where the stomach was practically free from larvae, the anterior end of the duodenum was heavily infested. No larvae were found in the oesophagus or pharynx."

O. G. Babcock, who is engaged in investigations of goat lice at Sonora, Tex., reports results of an experiment in dipping sheep for control of the sheep tick (*Melophagus ovinus* L.) as follows: "Two sheep having a light to medium infestation were dipped in vat containing Derris extract, at a dilution of 1 to 700. Two more sheep were dipped in the same material at a strength of 1 to 500. All animals were held in the vat for 1 minute at a dip temperature of 64.5° F. No injury to the sheep was noted. Forty-three hours after dipping examinations were made as follows: Derris extract, 1 to 500--all flies, 36, were dead, with the exception of one young one that had just emerged from the pupa, which was alive and active; Derris extract, 1 to 700--all flies were found dead after a period of 43 hours. From these sheep 41 *M. ovinus* adults were found dead after 43 hours."

W. E. Dove, Charleston, S. C., reporting on breeding places of sand flies, says: "From cages located about ditches at Savannah, sand flies emerged for periods of more than five months." Concerning treatments for sand-fly larvae, Mr. Dove and assistants report: "Following treatments of concentrations of sand-fly larvae near the city of Charleston, periodic collections have been made of soil samples taken from such areas. These samples continue to furnish evidence that more than 95 per cent of the larvae were killed by spraying the areas with phenolized sumpage water. \* \* \* The spray used in our treatments consisted of one part crude carbolic acid to 19 parts of sumpage water. The crude carbolic acid goes into solution with the resinous sumpage and is then soluble in salt water. The spray was used at the rate of 50 gallons to 12,000 square feet of marsh. The cost was 4.4 cents per gallon, which included only the price of the crude carbolic acid."

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#### STORED PRODUCT INSECTS

Wallace Colman, Silver Spring, Md., reporting on the use of paradichlorobenzene against moths in clothes closets, states: "All available closets have been used during the month for fumigation tests. The work with paradichlorobenzene has been conducted mainly along two lines: Short-period fumigation (72 hours) and relatively high concentrations of the vapor, and continuous fumigation with low concentrations. The latter has shown up remarkably well as a protection against damage by clothes moth larvae."

Newell E. Good, Sligo, Md., reports that his work during the past summer has added approximately 2,000 specimens of stored-product insects to the Bureau's collection.



In a report from S. E. McClendon, Thomasville, Ga., it is noted that "while times are hard more corn is probably being treated for (rice or black) weevils (Sitophilus oryzae L.) this fall than for two years past."

Reporting on life-history studies of the tobacco moth (Ephestia elutella Hbn.) at Richmond, Va., W. D. Reed says: \* \* \* "Moths could be collected in the infested warehouses in the vicinity of Richmond throughout October. The mild weather during the month permitted development of larvae and pupae to continue, which accounts for the presence of moths October 31."

George B. Wagner, of the Manhattan, Kans., laboratory, reports very successful results with the treatment of flour mills with hydrocyanic acid gas and by heat. The mills so treated with hydrocyanic acid gas were located at Blackwell, Okla., Hutchinson, Kans., and Topeka, Kans. The College Mill at Manhattan, Kans., was treated by heat.

C. K. Fisher, Modesto, Calif.: "The month of October has been spent principally with the examination of warehouse samples for evidence of (bean) weevil (Mylabris obtectus Say) infestation. To date (October 26), 2,343 warehouse samples have been examined since August 7, and 809 of these samples were found to be infested with bean weevils. This gives a percentage of 34.7 of the samples infested, as compared with 10.6 per cent at this time last year. The increase of weevily samples this year over last can be explained as follows: First, the bean market was very dull last fall and winter with very low prices prevailing, and as a result, many bean growers held their beans for a better price, and to avoid paying storage charges held them on the ranches over this summer. Most of these beans stored on the ranches were never fumigated and the few that were fumigated were not properly fumigated, with the result that many weevils were escaping from these beans and infesting the beans in the fields; second, the summer of 1931 was abnormally warm in California, probably causing an extra generation of weevils. This, in itself, means a great deal in bean weevil control."

Perez Simmons, of the Dried Fruit Insects Laboratory, Fresno, Calif., reports a series of trials with sulphur dioxide at high concentrations and short exposures, made in cooperation with Charles Fisher, chemist stationed at the Fresno office of the Dried Fruit Association of California. "Dosage rates of 1, 2, 3, and 4 pounds of SO<sub>2</sub> per 100 cubic feet gave, in general, progressively better kills as the time of exposure was lengthened. \* \* \* Complete kills resulted from exposure to the 2-pound dosage rate for 3 minutes; to the 3-pound rate for 2-1/2 minutes; to the 4-pound rate for 1-1/2 minutes; while the 1-pound rate failed at exposures up to 5 minutes. The fumigated raisins were analyzed for SO<sub>2</sub> by chemists employed by the Essotoo Company, and Mr. Fisher reported that no added sulphur dioxide was detected." Various other insecticide experiments were reported, including the use of chloropicrin. Mr. Simmons



says of the latter: "The use of chloropicrin has not increased this season, chiefly because of its slow dissipation after fumigation. The California Peach and Fig Growers Association used the gas on figs stored in the basement of their Fresno plant. The fumigation began on a Saturday, but workers were unable to enter the storage until the following Thursday."

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## TOXICOLOGY AND PHYSIOLOGY OF INSECTS

From F. L. Campbell and W. N. Sullivan, of the Takoma Park, Md., laboratory, we have the following note on toxicity of rotenone to house flies: "Maggots immersed in a suspension of rotenone for ten minutes were not affected. In a recent paper on the pharmacology of rotenone, Haag observed that blow-fly maggots completed their development normally in meat sprinkled with rotenone crystals. It is very strange that rotenone is so very effective against some insects and so ineffective against others."

J. W. Bulger and Abby Holdridge, Takoma Park, who previously recorded the median lethal dose "of acid lead arsenate for the last instar of the catalpa sphinx caterpillar as lying between 0.05 and 0.07 milligrams per gram and that for the fourth-instar silkworm as lying between 0.08 and 0.09 milligrams per gram," have made comparative tests on the relative susceptibility of the sphinx and the silkworm to a non-arsenical stomach poison. They found that "the median lethal dose \* \* \* for the catalpa sphinx caterpillar" of the same sample of copper cyanide that F. L. Campbell had tested three years before against the silkworm "lies between 0.02 and 0.03 milligram per gram. For the silkworm \* \* \* the median lethal dose lies between 0.03 and 0.04 milligram per gram. These results show that the relative susceptibility of the two species for acid lead arsenate and copper cyanide is about the same. Thus we have some data to show that the relative toxicity of a series of stomach poisons determined for a standard test insect, such as the silkworm, may be the same for related species. But much more work must be done before a generalization can be made."

M. C. Swingle, who is making experiments on insect nutrition at Takoma Park, submits the following note on the mortality of American cockroaches in cages: "About 150 cockroaches (Periplaneta americana L.) were collected on nightly visits to a \* \* \* meat-packing concern. Out of this number there were about 50 female cockroaches which were held for oviposition. Forty of these were placed in pint fruit jars with the glass lid placed loosely on the top. The remaining ten were placed in specially constructed cages made of celluloid, wire screen, and wood. The roaches were fed oatmeal, lettuce leaves, and meat scraps, with a plug of moist cotton for water. To date one hundred egg cases (approximately 2,000 eggs) have been obtained from the females collected. Of the forty roaches kept in jars, seven are still alive, while not a



single roach from the specially constructed cages has died. This is probably due to a more natural circulation of air in the cages, and illustrates the necessity of keeping insects under absolutely natural conditions when experiments are desired to be of scientific value." (The conclusion in last sentence gets a big endorsement from Chief of Bureau!)



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